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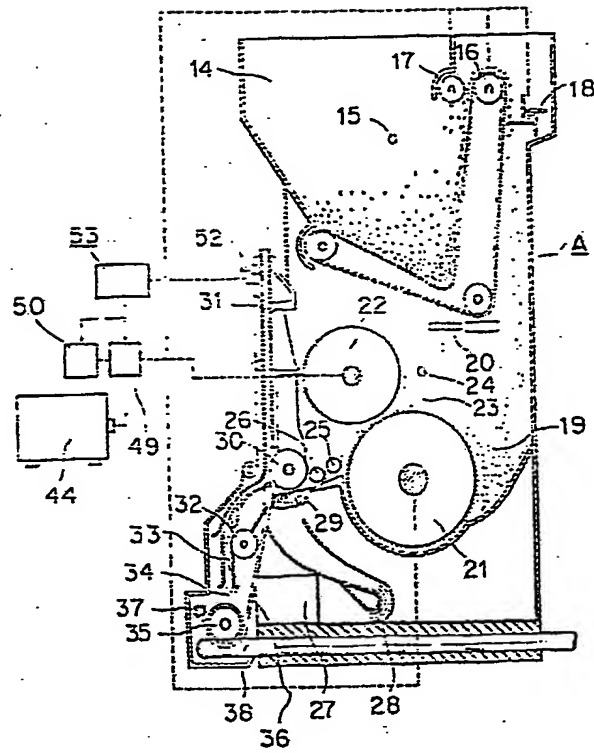
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⑤④ **Shredded tobacco feeding device for a cigarette making machine.**

⑤⑦ A shredded tobacco feeding device (A) for use with a cigarette making device which can eliminate a trouble of and damage to the machine which may be caused by shredded tobacco pieces stuffed in a path (31) for feeding shredded tobacco pieces to a cigarette conveyor of the cigarette making machine.

The device comprises detecting means (52-53) located in the path (31) adjacent the cigarette conveyor for detecting shredded tobacco pieces accumulated in the path, whereby if shredded tobacco pieces begin to accumulate in the path, then the feeding device is immediately stopped (49-50) in response to a detection signal received from the detecting means.

FIG. 2



SHREDDED TOBACCO FEEDING DEVICE FOR A CIGARETTE MAKING MACHINE.

5 The invention relates to a shredded tobacco feeding device for a cigarette making machine which is not damaged or broken at all even if it is jammed by shredded tobacco fed by the shredded tobacco feeding device.

10 Such a machine, for example, as illustrated in Fig. 1 is conventionally known as a cigarette making machine. Referring to Fig. 1, reference numeral 1 designates a feeding device, 2 a chimney, 3 a perforated cigarette conveyor, 4 a trimming device, 5 a cloth tape, 6 roll paper, 7 a pasting device, 8 a heater, 9 a density detector, and 10 a cutter.

15 In the cigarette making machine, shredded tobacco is sucked into and moved up within the chimney 2 of the feeding device 1 and is attracted to a lower portion of the perforated cigarette conveyor 3 to form a layer of the shredded tobacco. The layer of the shredded tobacco is fed leftwardly as seen in Fig. 1 and is adjusted to have a suitable thickness by the trimming device 4 whereafter it is transferred onto the roll paper 6 placed on the cloth tape 5 and is wrapped in the same. The shredded tobacco is then pasted and is dried by the heater 8 to thus make a cigarette in the form of a bar. The bar-like cigarette thus formed is passed through the density detector 9 in order to measure the density of the cigarette whereafter it is cut into several cigarettes by the cutter 10. The cigarettes thus cut are then transferred onto and transported by a conveyor (not shown). During such transportation, non-conforming cigarettes are removed from the conveyor by means of a magnet valve (not shown) located midway of the transporting path so that only conforming cigarettes may be loaded onto trays (not shown).

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During running of the cigarette making machine, if shredded tobacco having a high density is fed in the form of a dumpling or block from the feeding device or if foreign articles such as filter plug pieces are mixed in shredded tobacco, then the shredded tobacco may first accumulate in the neighbourhood of the trimming device 4, and then, after passing a flapper (not shown), the shredded tobacco may gradually accumulate in the chimney 2 from the top of the same.

Where the production capacity of the cigarette making machine is about 2000 units per minute or so, even if the machine is stopped after an operator finds that something is wrong with the machine, the chimney 2 will not be filled with shredded tobacco and hence no serious problem will occur. However, since various improvements have been made in recent years to an extent to enable production of up to 8000 cigarettes per minute, if accumulation of shredded tobacco or jamming of the machine should once occur, such accumulation would progress in a short period of time to fill the chimney 2 with shredded tobacco. If the chimney 2 is thus filled with shredded tobacco, then shredded tobacco will accumulate also to a picker winnower (not shown) installed adjacent a lower end of the chimney 2. As a result, a drum (not shown) will be acted upon by a heavy load to cause a trouble in the machine while the shredded tobacco will be compressed into a block like a wood, which will cause a trouble to damage several portions of the feeding device 1.

The present invention has been made in consideration of such circumstances as described above, and it is an object of the invention to provide a shredded tobacco feeding device for a cigarette making machine wherein, when jamming occurs, operation is immediately stopped to prevent a trouble of and damage to the machine.

In order to attain this object, according

to the present invention, a shredded tobacco feeding device for use with a cigarette making device for feeding shredded tobacco pieces produced from shredded tobacco and having a size sufficient to allow the  
5 shredded tobacco pieces to be wrapped in roll paper to a cigarette conveyor of the cigarette making machine is characterized in that detecting means for detecting that shredded tobacco pieces accumulate in a path for feeding shredded tobacco pieces having a size sufficient  
10 to allow the shredded tobacco pieces to be wrapped in roll paper to the cigarette conveyor is provided at a position of the path adjacent the cigarette conveyor such that the feeding device may be stopped in response to an accumulation detection signal outputted from the  
15 detecting means.

Now, an embodiment of the present invention will be described with reference to the accompanying drawings.

Fig. 1 is a front elevational view  
20 generally showing a conventional cigarette making machine;

Fig. 2 is a cross sectional view, in schematic representation, of a shredded tobacco feeding device according to an embodiment of the present invention;

25 Fig. 3 is an enlarged partial view of the shredded tobacco feeding device of Fig. 2;

Fig. 4 is a perspective view, in schematic representation, illustrating a power transmitting mechanism;

30 Fig. 5 is a schematic view illustrating an arrangement of a cigarette conveyor and associated components; and

35 Figs. 6a, 6b, 6c and 6d are diagrammatic representations illustrating operations of a photoelectric detector.

Referring to Fig. 2 which is a cross sectional view illustrating, in schematic representation, an embodiment of a shredded tobacco feeding device according to the present invention, shredded tobacco is thrown into a storage tank 14 in most cases by air. The quantity to be contained in the storage tank 14 is determined in accordance with the height of a photoelectric tube 15. In particular, if the top face of shredded tobacco becomes positioned lower than the position of the photoelectric tube 15, then shredded tobacco is additionally thrown into the storage tank 14. Shredded tobacco within the storage tank 14 is lifted by a needle belt 16 and only that shredded tobacco which exists among needles of the belt 16 is allowed to pass by a scraping roller 17 which scrapes excessive shredded tobacco off the needle belt 16 so as to establish a predetermined fixed relationship between the speed of the needle belt 16 and the quantity of passing shredded tobacco. The shredded tobacco which has passed by the scraping roller 17 is scraped off the needle belt 16 by a blade 18 and drops into a shred pool 19. Shreds which have been removed by a trimming device 4 (refer to Fig. 5) and transported by a vibrating belt 20 is also dropped into the shred pool 19 and joined to the shredded tobacco which has been fed by the needle belt 16.

The shredded tobacco in the shred pool 19 is carried upwardly by needles implanted to a first drum 21. A bar-like shred 23 is formed by and between the first drum 21 and a second drum 22 which rotates in a direction to prevent shredded tobacco from passing through a gap between the first and second drums 21 and 22. In order to control the size of such bar-like shreds 23 to always remain identical, when shredded tobacco is detected by a photoelectric tube 24;

the speed of the needle belt 16 is reduced, and on the contrary when shredded tobacco is not detected by the photoelectric tube 24, the speed of the needle bed 16 is increased. As a result, the quantity of shredded tobacco which passes through the gap between the first and second drums 21 and 22 is always held constant.

The shredded tobacco which has passed through the gap between the first and second drums 21 and 22 is broken by a picker 25 into pieces which have a size suitable for wrapping in roll paper. The shredded tobacco is then accelerated to be discharged by a winnower 26.

Such pieces of shredded tobacco thus discharged is attracted, where they are light in weight, to an attracting roller 30 by air which is blown out from holes 29 after the air has been fed under pressure from a duct 27 and changed into uniform air flows by a flow regulating plate 28. The light pieces of shredded tobacco are then lifted within a chimney 31 and are layered on a perforated cigarette conveyor 3 (refer to Fig. 5). On the other hand, heavy pieces of shredded tobacco advance straightforwards as illustrated in detail in Fig. 3 and are thrown out into a channel 33 by a throwing out drum 32. An air window 34 is located at a lower portion of the channel 33, and since air is flown upwards in the channel 33, only heavy pieces, that is, stems existing among shredded tobacco are allowed to drop onto a perforated roller 35.

The perforated roller 35 has a great number of perforations formed therein for classifying stems thus separated from among the shredded tobacco. Those stems which can be received in the perforations of the perforated roller 35 are regarded as allowable stems and are returned to the flow of shreds by way of another channel 36. Stems which cannot be received in

the perforations are scraped off by a brush roller 37 and are carried away by means of an air feeding 38 pipe (refer to Fig. 2).

Fig. 4 illustrates a power transmission mechanism. The entire cigarette making machine is installed on a bed 39. Rotation of a main motor 40 is transmitted to a main shaft 44 by way of pulleys 41, 42 and 43 and further to the feeding device A by means of further pulleys 45 and 46.

A brake 48 is provided on a shaft 47 for the pulley 42 in order to stop running of the machine in a short period of time.

The pulley 46 provides a power inputting means to the feeding means A, and rotation of the pulley 46 is transmitted to rotationally drive, via an electromagnetic coupling 49 (refer to Fig. 2) and a shaft (not shown), the above described needle belt 16, the scraping off roller 17, the blade 18, the first and second drums 21 and 22, the perforated roller 35 and so on.

During normal running of the machine, a voltage is applied to the electromagnetic coupling 49 to transmit rotation of the pulley 46 to the shaft. An electromagnetic brake 50 is coupled to the shaft. During normal running, the electromagnetic brake 50 remains inoperative.

A photoelectric detector 52 of the reflective type is located adjacent an exit of the chimney 31 (that is, at a location in the neighbourhood of the cigarette conveyor 5 and adjacent a flapper 51) as seen in Figs. 2 and 5.

The photoelectric detector 52 is operable to irradiate light to an inner wall face 31a so as to go across shredded tobacco moving upwardly in an air flow within the chimney 31 and to receive the light reflected



from the inner wall face 31a as illustrated in Fig. 6a for detecting presence or absence of jamming or accumulation. If jamming by shredded tobacco occurs, such reflected light is not received by the photoelectric detector 52, for example, as seen in Fig. 6b, and an output of the photoelectric detector 52 thus presents a corresponding change.

Output of the photoelectric detector 52 is inputted to a jamming discriminating circuit 53 which effects predetermined signal processing. If the jamming discriminating circuit 53 detects jamming from an output of the photoelectric detector 52, it outputs a control signal to stop voltage application to the electromagnetic coupling 49 and to initiate voltage application to the electromagnetic brake 50.

It is to be noted that where the photoelectric detector 52 employed is otherwise of the penetrating type, a light source 52a may be disposed in opposing relationship to the photoelectric detector 52 as seen in Fig. 6c such that light may be irradiated across shredded tobacco moving up within the chimney 31 to the photoelectric detector 52. Thus, if jamming by shredded tobacco occurs, light is not received by the photoelectric detector 52, for example, as shown in Fig. 6d, and hence an output of the photoelectric detector 52 presents a corresponding change.

Operations of the embodiment as described above will now be described.

Pieces of shredded tobacco produced in such a way as described hereinabove and having a size suitable to wrap in roll paper 6 are attracted in a layer from the chimney 31 to a lower part of the perforated cigarette conveyor 3 located below a suction chamber 54. The shredded tobacco pieces thus attracted in a layer is carried leftwardly as in Fig. 5. Thereupon, the

flapper prevents atmospheric air from being introduced into the chimney 31 to disturb the layer of the shredded tobacco pieces.

5 The layer of the shredded tobacco pieces is then transported by the cigarette conveyor 3 and is adjusted into a suitable thickness by the trimming device 4 while excessive shredded tobacco pieces are fed back to the shred pool 19 by means of the vibrating conveyor 20.

10 The shredded tobacco pieces thus transported are then transferred onto roll paper 6 placed on a cloth tape 5 and are wrapped in the roll paper 6 and compressed to have a circular cross section.

15 During such running, if shredded tobacco having a high density, for example, in the form of a dumpling or block, is fed or if foreign articles such as filter plug pieces are mixed among shredded tobacco, shredded tobacco pieces will first accumulate in the neighbourhood of the trimming device 4, and then such  
20 accumulation will proceed to the flapper 51, and finally shredded tobacco pieces will accumulate in the chimney 31 beginning from the top thereof.

After such accumulation of shredded tobacco begins, an output of the photoelectric detector  
25 21 will exhibit a change so that the jamming discriminating circuit 53 will provide a control signal to disengage the electromagnetic coupling 49 to interrupt transmission of rotation of the pulley 46 to the shaft. Meanwhile, the electromagnetic brake 50 will operate  
30 to stop rotation of the shaft.

As a result, rotation of the needle belt 16, the scraping off roller 17, the blade 18, the drums 21 and 22, and so on, will stop immediately, thereby preventing shredded tobacco pieces from being stuffed in the  
35 chimney 31. Accordingly, a trouble of and damage to the

machine caused by jamming of the chimney 31 can be eliminated.

It is to be noted that since the feeding device A normally has only a low inertia, even if the  
5 electromagnetic brake 50 is omitted, a trouble of and damage to the machine to be caused by shredded tobacco stuffed in the chimney 31 can be similarly prevented although there may be some delay of time.

It is also to be noted that the feeding  
10 device A is not limited to that of the embodiment, and various types may be employed therefor.

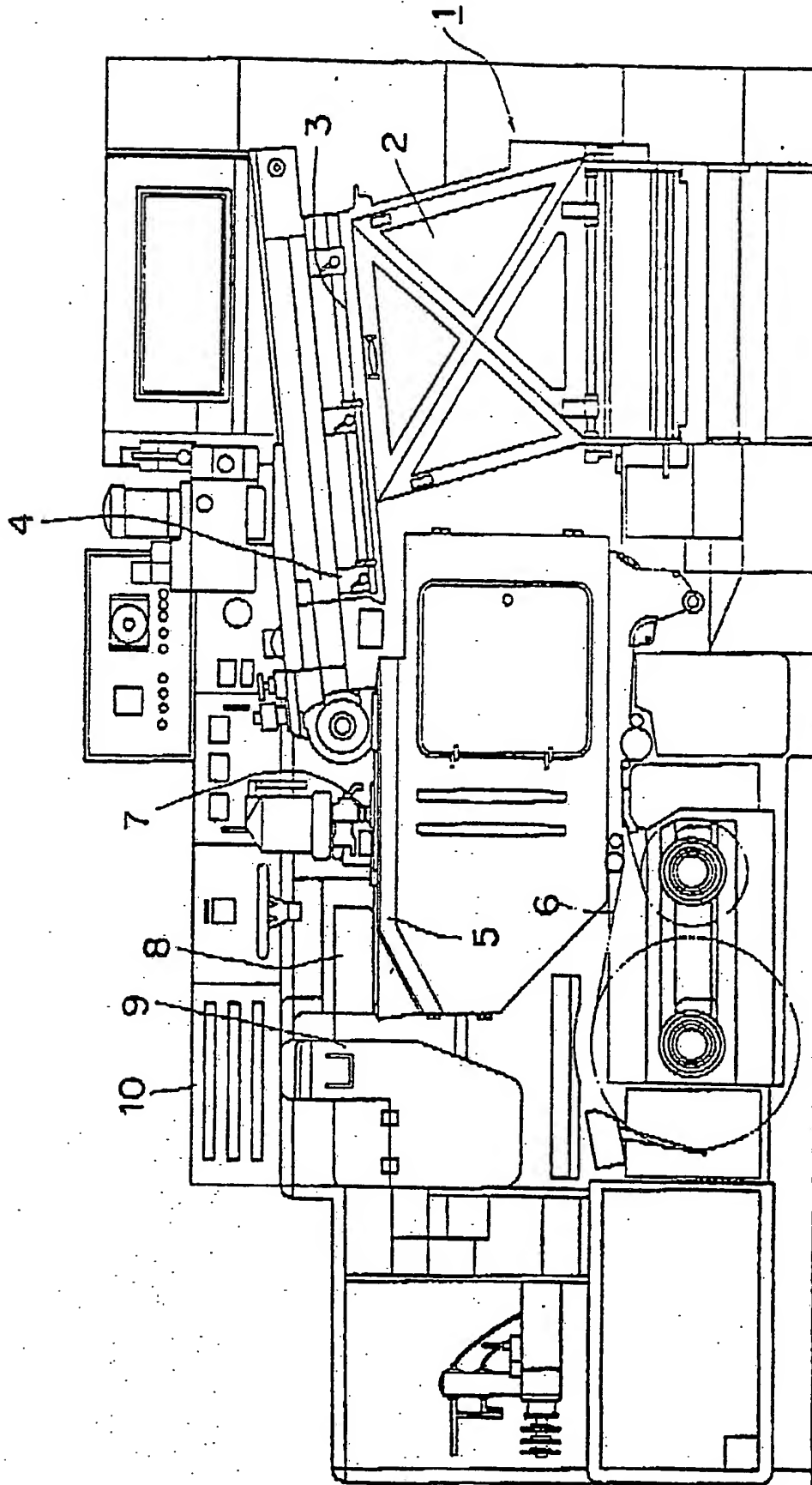
As apparent from the foregoing description, in a shredded tobacco feeding device according to the present invention, detecting means (photoelectric  
15 detector 52, jamming discriminating circuit 53) for detecting that shredded tobacco pieces accumulate in a path (chimney 31) for feeding shredded tobacco pieces of a size sufficient to allow the shredded tobacco pieces to be wrapped in roll paper to a cigarette conveyor  
20 is provided at a position of the path adjacent the cigarette conveyor such that the feeding device may be stopped in response to an accumulation detection signal outputted from the detecting means. Accordingly, if shredded tobacco begins to accumulate, the feeding device  
25 can be stopped immediately. And hence, even if the production capacity of cigarettes is improved, a trouble of and damage to the machine arising from accumulation of shredded tobacco can be eliminated.

CLAIM

A shredded tobacco feeding device (A) for use with a cigarette making device for feeding shredded tobacco pieces produced from shredded tobacco and having a size sufficient to allow the shredded tobacco pieces to be wrapped in roll paper (6) to a cigarette conveyor (3) of said cigarette making machine,

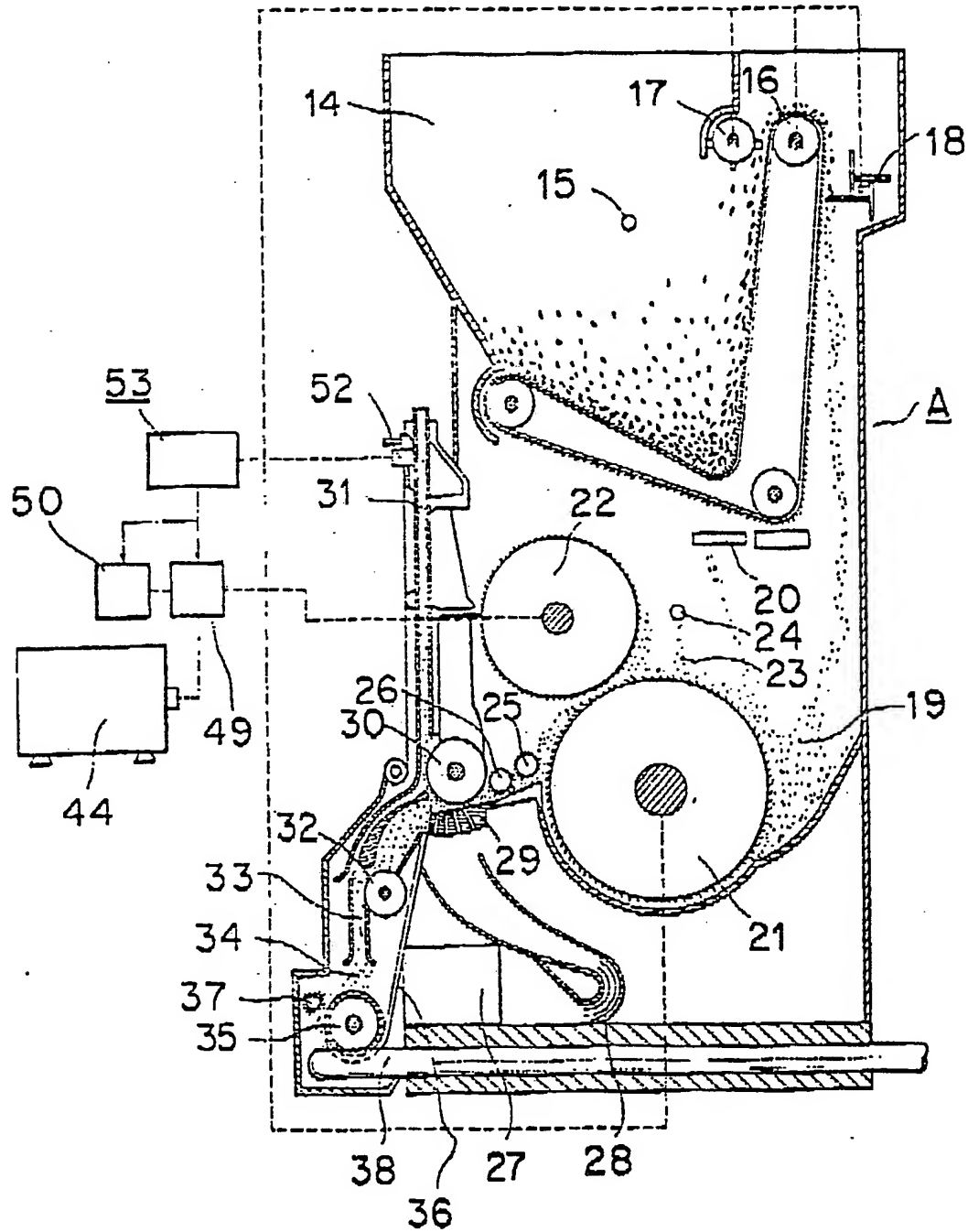
characterized in that detecting means (52 + 53) for detecting that shredded tobacco pieces accumulate in a path (31) for feeding shredded tobacco pieces having a size sufficient to allow the shredded tobacco pieces to be wrapped in roll paper to said cigarette conveyor (3) is provided at a position of said path (31) adjacent said cigarette conveyor such that said feeding device may be stopped (49-50) in response to an accumulation detection signal outputted (53) from said detecting means (52-53).

FIG. 1



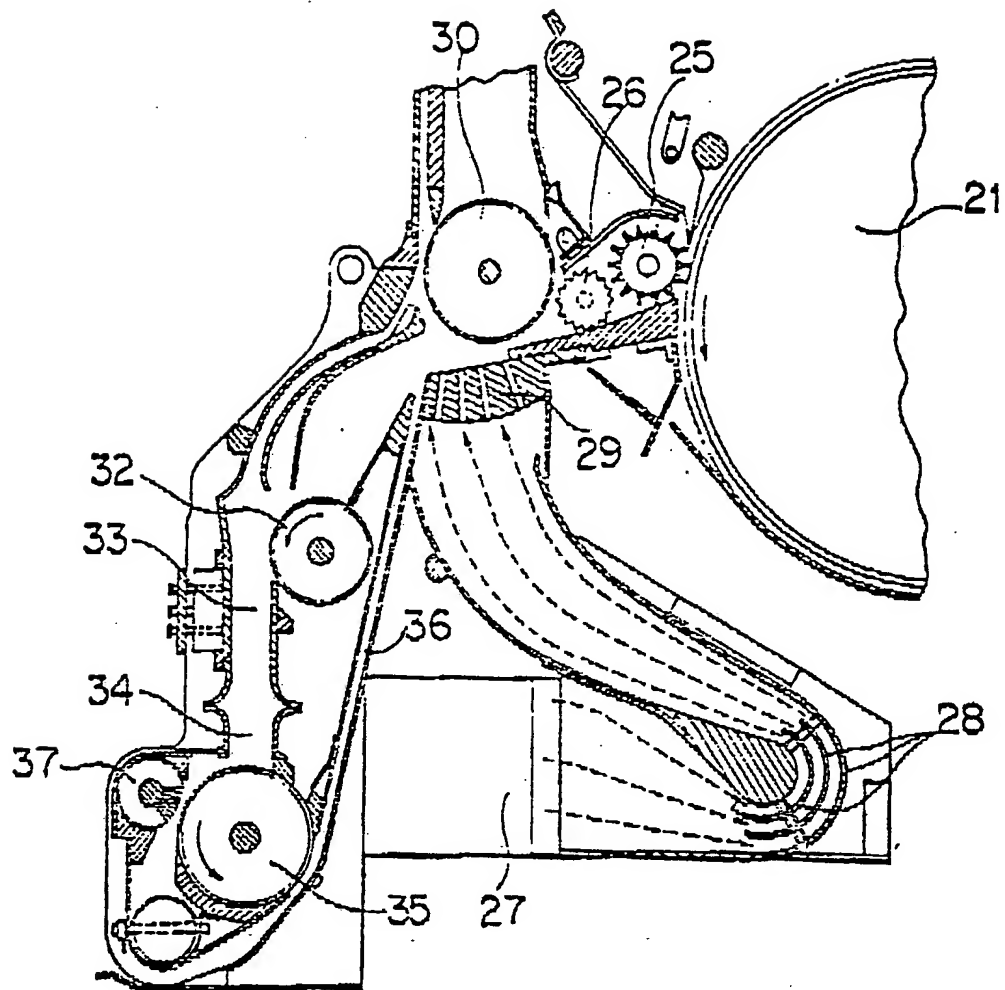
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FIG. 2



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FIG. 3



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FIG. 4

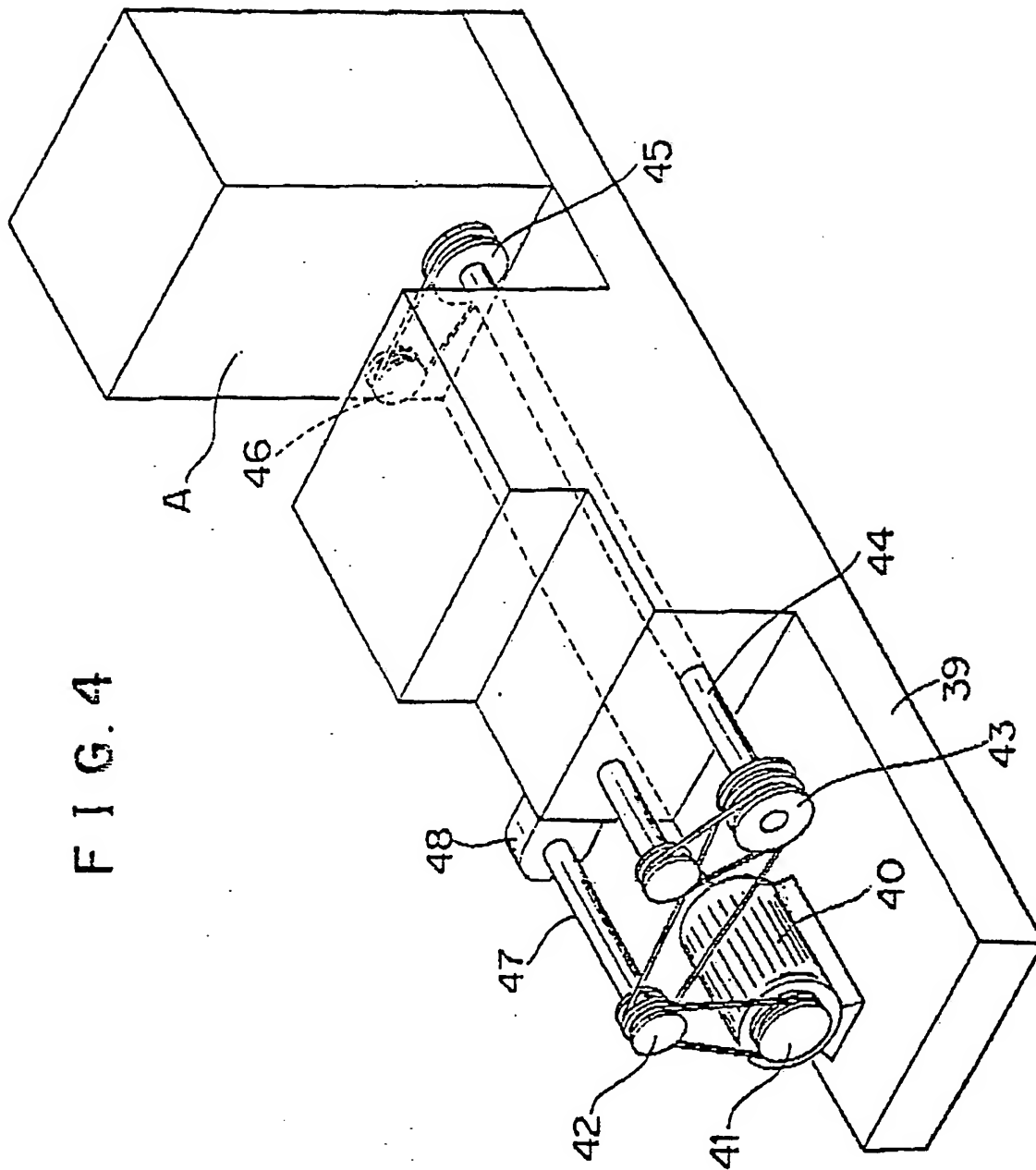
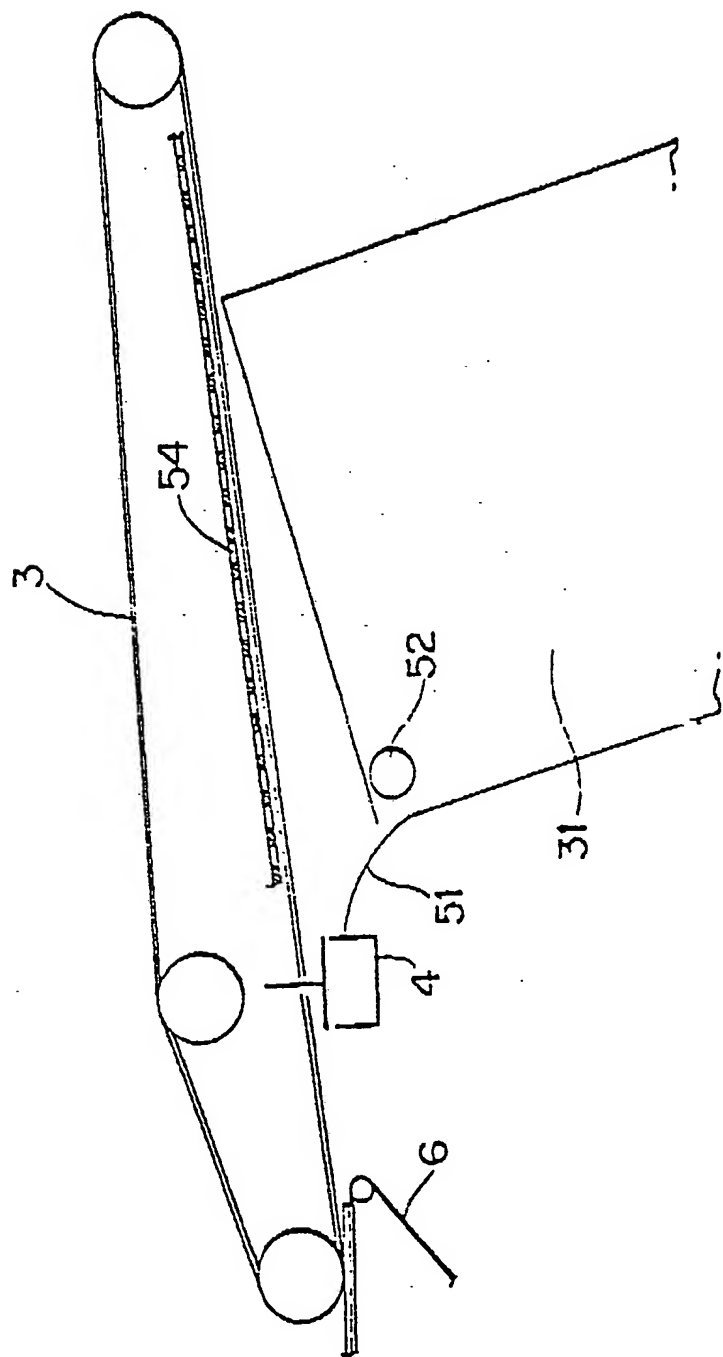




FIG. 5



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FIG. 6a

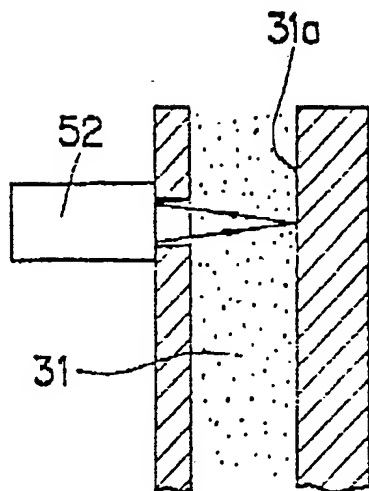


FIG. 6b

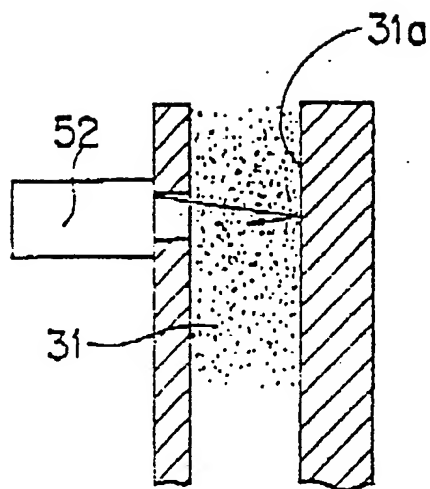


FIG. 6c

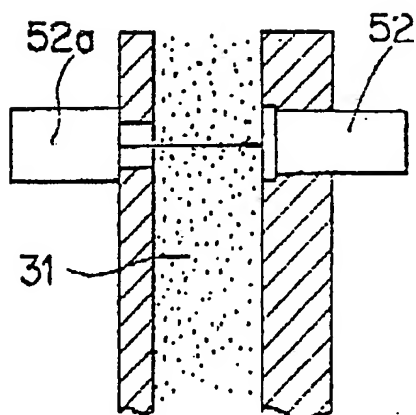
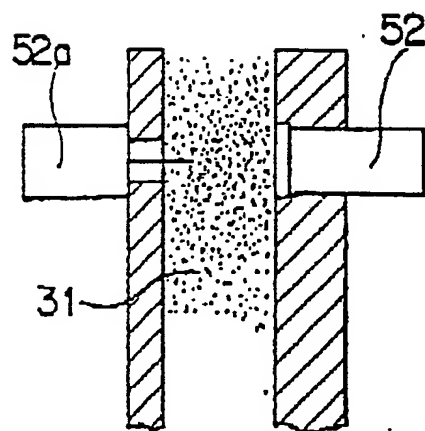


FIG. 6d





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. <sup>4</sup> )
X	GB-A-2 088 693 (SASIB S.P.A.) * Figures 1,3,4; page 2, lines 22-80 *  -----	1	A 24 C 5/39 A 24 C 5/18
			TECHNICAL FIELDS SEARCHED (Int. Cl. <sup>4</sup> )
			A 24 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16-08-1985	Examiner RIEGEL R.E.
<b>CATEGORY OF CITED DOCUMENTS</b>			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	